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2. Project Description

The building, originally built in 1961, is a 9,548 square foot wood/masonry framed single story building. It was expanded and renovated in 1995. It rests on a concrete slab on grade foundation on 2/3's of the foot print and a full basement on 1/3 of the foot print. The facade of the building is a combination of vinyl siding, brick, block and the roof is asphalt shingles.

The front entrance of the building faces a north easterly direction, for the purpose of this report the front of the building will be considered north. The floor plan includes equipment bays, office space, meeting room, conference room, toilet facilities and storage space.

The building presently serves as the fire department for the town. However the building is also being used by the community action and parks/recreation employees temporarily. This was not taken into consideration for this report because it is temporary and no data is available.

3. Executive Summary

3.1 Introduction:

This report details the recommendations and findings of the audit report conducted for the Eliot Fire Department located at 1333 State Road in Eliot, Maine. The site visits were conducted on March 14 & 15, 2011. At the time John Monaghan met with Edward Henningsen of the Energy Committee and Jay Muzeroll the Fire Chief.

This assessment recommends twenty (20) Energy Conservation Measures (ECMs) addressing the electric and # 2 fuel usage; increasing comfort and cost savings. Details of the findings and recommendations are contained in the assessment.

The priorities are to apply air sealing, infill and insulate gaps and voids, retrofit the insulation in the attic, weather strip the over head doors, improve the lighting, install an outdoor reset, install a unit heater in the basement and replace the domestic hot water system.

3.2 Identified Energy Conservation Measures:

1. Building Envelope Improvements

a. **Provide general air sealing throughout the building**
b. **Infill top of CMU wall, around kitchen vent, between buildings and apply 3” of spray foam**
c. **Apply 3” of spray foam to rim and band joists**
d. **Retrofit blow- in insulation at original section attic**
e. **Remove top layer of batt insulation at the 1995 section and replace it with 8” of blown in cellulose.**
f. **Replace weather stripping at overhead doors**
g. **Replace the east and west man doors with energy efficient doors**
h. **Install an insulated attic hatch and weather strip the perometer**

2. Energy Efficient Lighting

a. **Re-ballast &re-lamp the existing T12 fixtures to T8’s**
b. **Install occupancy sensors**
c. **Replace incandescent bulbs with CFL’s or LED’s**
d. **Replace the HPS exterior fixtures with LED’s**
e. **Replace the man door fixtures with LED’s**

3. Heating System

a. **Replace existing thermostats with programmable thermostats**
b. **Install an outdoor reset**
c. **Install a fan powered unit heater in the garage/basement & add a zone**
d. **Seal and insulate the duct work in the basement**
e. **Develop a boiler replacement plan**

4. Domestic Hot water

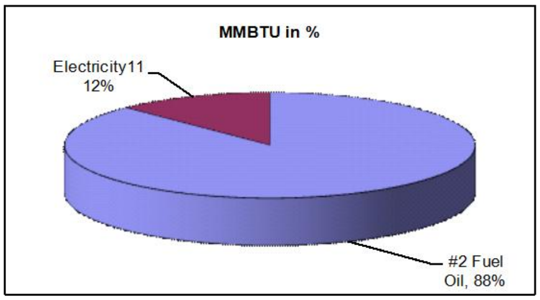
a. **Insulate the water lines in the mechanical room**
b. **Replace the existing hot water coil with a propane fired tankless water heater**

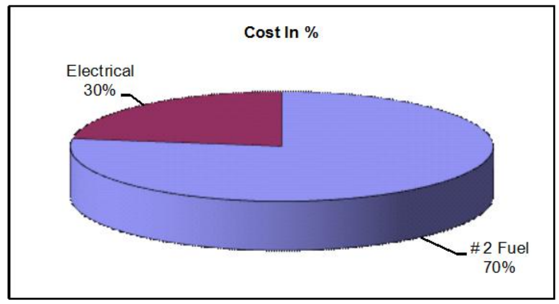
Location	Energy Conservation Measure	Annual Cost Savings in Dollars	Annual Electric Savings in kWh	Annual Oil Savings in Gallons	Annual Propane Savings in Gallons	Annual CO2 Emissions Savings in Tons	Cost of Work	Simple Payback in Years	SIR
Fire Dept	Lighting								
	Retro T12 & add sensors	$246	1545			0.80	$6,055	24.6	0.61
	Change CFL to LED	$14	88			0.05	$60	4.3	2.33
	HPS & Spots to LED	$206	1287			0.66	$900	4.4	2.29
	LED at Man & OH Drs	$207	1297			0.67	$1,010	4.9	2.05
		$673	4217			2.17	$8,025	11.9	
	Bldg Envelope								
	Air seal	$571	223	170	0	2	$ 2,600	4.6	3.29
	Tops Wall	$302	118	90		1	$ 1,118	3.7	4.05
	Rim Joist	$245	96	73		1	$ 1,056	4.3	6.96
	Retro Original Attic	$323	126	96		1	$ 1,922	6.0	4.20
	Retro New Attic	$605	237	180		2	$16,200	26.8	0.93
	Man Door	$161	63	48	0	1	$2,200	13.7	0.73
	Weather Strip OH Doors	$188	74	56	0	1	$920	4.9	2.04
	Insulate Hatch	40	16	12	0	0	75	1.9	13.33
	Sub Total	$2,435	953	725		10	$26,091	10.71	
	HVAC								
	Prog T/stats	$203	80	64		1	$ 600	3.0	5.08
	Outdoor Reset	$378	140	120		2	$ 1,200	3.2	6.30
	Add zone & unit heater	$315	110	100		1	$ 2,550	8.1	2.47
	Seal & Insulate duct work	$205	78	65		1	$1,260	6.1	3.25
	Install On Demand DHW	$269	165	141	0	2	$2,150	8.0	1.88
		$1,370	573	490		7	$ 7,760	5.7	
	Totals	$4,478	5,743	866	0	19	$41,876	9.4	

4. Energy Usage

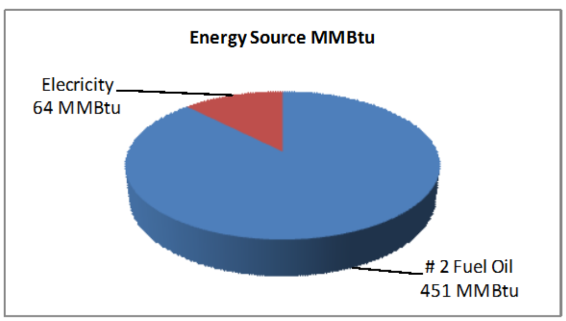
The energy usage of the building is from three sources: electricity for lighting, and power; #2 fuel oil for heat and domestic hot water, and propane for cooking and emergency power. The use of propane will not be addressed in the report since it does not play a role as an energy source.

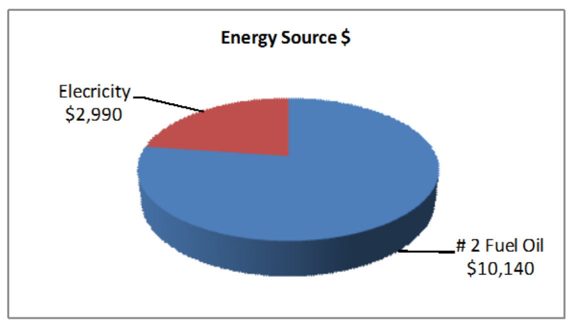
The first series of pie charts show the energy usage in percent for both BTU's, the common energy measurement unit and as the cost of energy.





The second series of pie charts shows the energy usage in millions of BTU's (MMBtu) and the cost in dollars.





As shown in the pie charts, #2 fuel oil accounts for the greater portion of the energy usage in cost, 70% in dollars and is the greater in energy units, 88 % of the BTU's. However, it is still more costly to produce a BTU of electricity.

4.1 Historic Energy Consumption

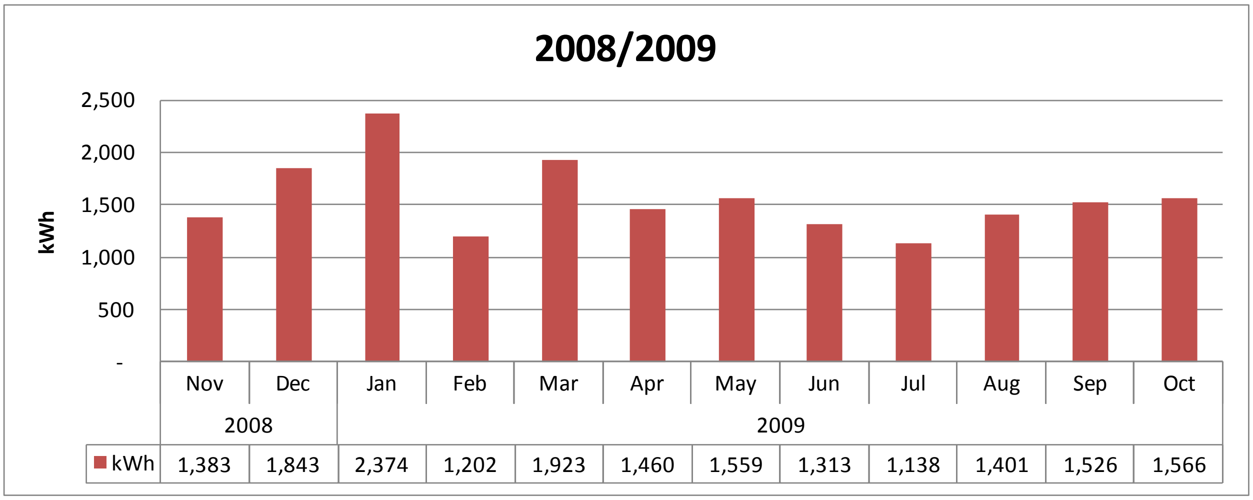
1. Electrical

Usage is shown in the table and graph below for Nov. 2008 through Oct. 2009. The baseline average monthly consumption is about 1,560 kWh/month.

Electrical use per square foot is 1.96 kWh as compared to the New England average of 10.8 kWh or 18 % of the average for commercial buildings in New England. The low percentage reflects the low hours of building use.

However there are still opportunities to improve the electrical usage.

Eliot FD			
Electricity Usage-2009			
		kWh	Cost (incl demand)
2008	Nov	1,383	221
	Dec	1,843	295
2009	Jan	2,374	380
	Feb	1,202	192
	Mar	1,923	308
	Apr	1,460	234
	May	1,559	249
	Jun	1,313	210
	Jul	1,138	182
	Aug	1,401	224
	Sep	1,526	244
	Oct	1,566	251
	Total	18,688	$2,990
12 Mo	Avg	1,557	$249
Avg	$/kW		$0.16

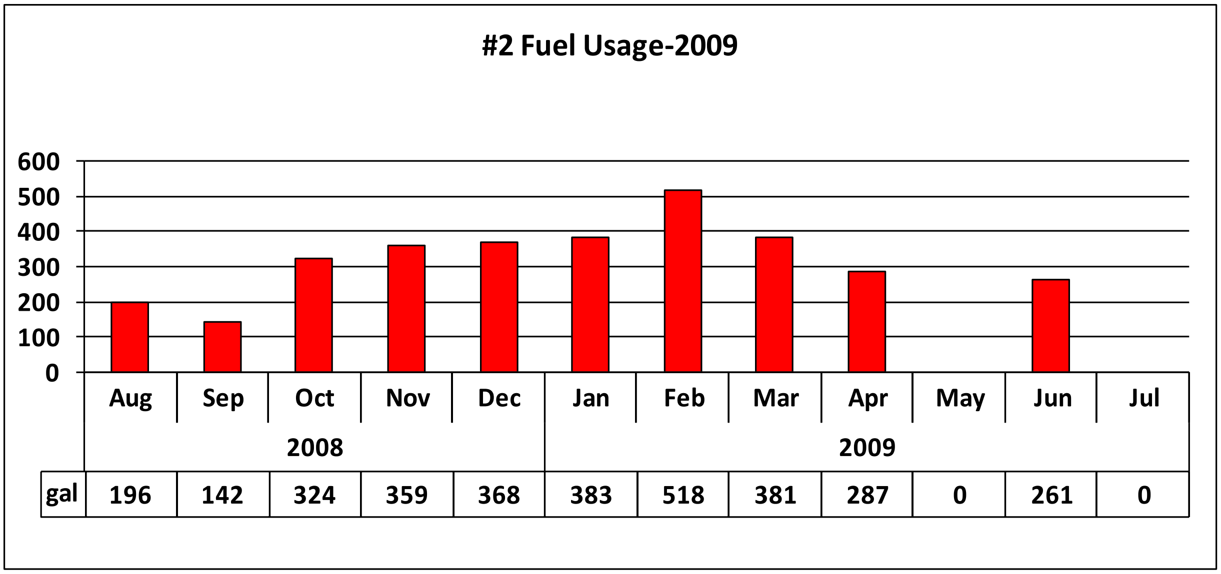


2. # 2 Fuel:

The # 2 fuel usage for August 2008 through July2009 is shown below in the table and graph. The oil usage mostly coincides with the colder winter weather.

The fuel oil usage on a square foot basis is .34 gals/SF as opposed to .32 gals/SF and 47,199 BTU/SF as opposed to 44,480 BTU/SF or 106 % of the average for commercial buildings in New England. This includes heat and domestic hot water.

Eliot FD			
#2 Fuel Usage-2009			
		gal	cost
2008	Aug	196	619
	Sep	142	448
	Oct	324	1,020
	Nov	359	1,132
	Dec	368	1,160
2009	Jan	383	1,207
	Feb	518	1,630
	Mar	381	1,200
	Apr	287	903
	May	0	0
	Jun	261	822
	Jul	0	0
	Total	3,219	$10,141
Month	Average	268	$845
$/gal	Average		$3.15



	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
	2008					2009						
gal	196	142	324	359	368	383	518	381	287	0	261	0

5. Building Envelope

The building, built in 1970, was expanded and renovated in 1995. The expansion included adding the new apparatus bay, offices, and conference room, renovating some of the existing space, and upgrading the heating and electrical system.

A blower door test was performed on the building; at 50 Pa it was 18,555 CFM, which equates to .51 ACH at natural conditions. The ACCA states in Manual N for Commercial buildings that for a building this size a tight building is .31 ACH and an average building is .49 ACH, placing the building somewhat higher than average. The goal is to have a tight building, but at a minimum less than average in the .40 ACH range. The air infiltration indicates the building is a good candidate for air sealing.

The east and south of the original building walls are 8” masonry block with vinyl siding on the exterior and the north wall is exposed brick with CMU. The east and south walls are believed have a 1½” layer of rigid foam insulation on the exterior under the vinyl siding and the north wall is not believed to have insulation. The estimated R value of the walls is R-10, the overhead doors R-8 and the man doors R-2 to 4. The interior is painted masonry or dry wall. The ceilings are suspended acoustical and painted dry wall ceilings. The roof is wood framed truss covered with sheathing and asphalt shingles over the original flat roof. There is a layer of fiber board insulation at the original roof and about 10” to 12” of blown in fiberglass which has been pushed back in many locations. The estimated R value of the attic/ceiling space is R-21.

The area between the new and old building has an opening, the tops of the block walls are open, and the gap exists around the kitchen vent, both creating a chimney effect.

The batt insulation stuffed into the band joist above ceiling does not provide an air barrier and is a poor insulator. The rim joist in the basement has no insulation.

Penetrations, cracks, gaps and voids at the walls and ceilings are recommended to be air sealed. The tops of the block walls, the area around the vent and the opening between the buildings should receive a backer and have 3" of spray foam applied to them. The attic should have new insulation blown into it where the insulation has been disturbed, raising the R- value of the attic/ceiling to an estimated R-38. The rim joist should have the batt insulation removed and where ever accessible the band and rim joists should have 3" of spray foam applied to them to insulate and air seal them.

The 1995 section is wood framed with 2x6 walls and a wood truss roof. The walls and ceilings are finished with painted dry wall. The walls are 6" batt and the estimated composite R value is R-19 and the doors are the same as the original section of the building.

There are two layer of 6"fiber glass batt insulation, the first layer is nested between the 2x6 trusses and the second layer is perpendicular to it. The initial installation appears to have been average, but subsequent work in the area has disturbed much of the insulation degrading its R-value. The estimated R value of the attic/ceiling space is R-19.

Penetrations, cracks, gaps and voids at the walls and ceilings are recommended to be air sealed. The attic should have the top layer of insulation removed, the lower layer refitted and 8" of settled cellulose blown into the attic space, raising the R- value of the attic/ceiling to an estimated R-45.

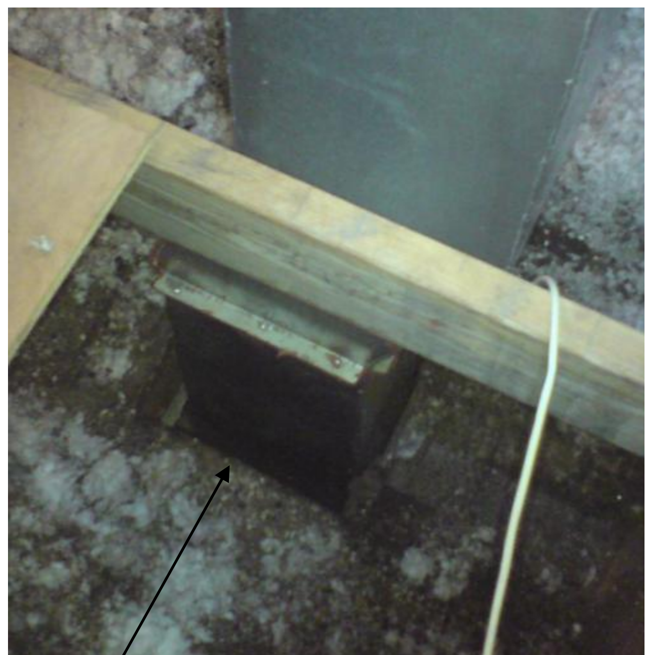
Both sections of the building should have an elevated walk way installed.

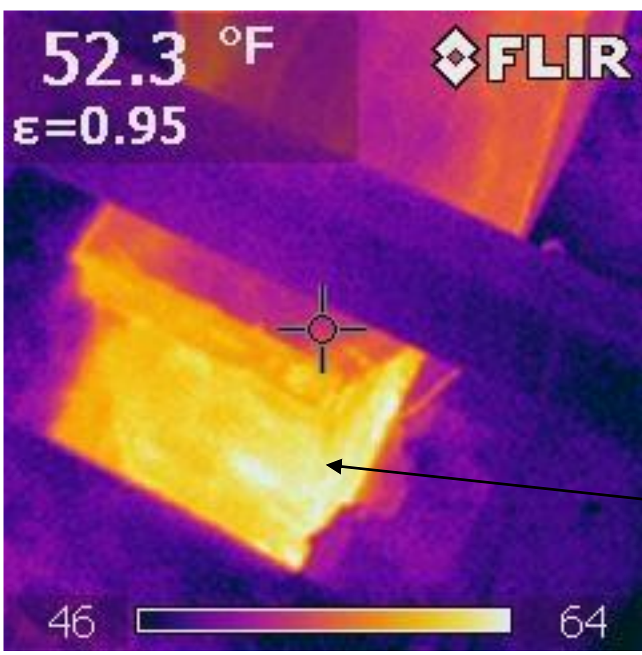
The weather stripping of the overhead doors and man doors are worn and two of the man doors are approaching the end of their useful life. It is recommended that the doors have the weather stripping replaced with a commercial grade material. Replacing the two man doors in the 1995 section of the building should also be considered.

The hatch to the attic is un-insulated and it is recommended that it receive a new hatch with4" of rigid insulation, insulating it to an R-25, and the perimeter of the hatch should be weather stripped.

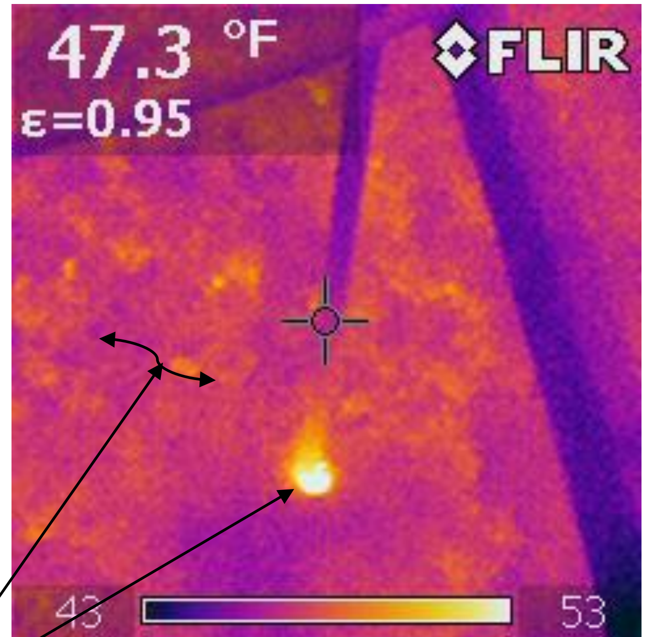
The purpose of including the following photos is to offer a visual representation of the present condition of the building envelope so the reader may have a better understanding of the situation and why the recommendations are being made.

View showing top of unsealed & un-insulated block wall creating a chimney affect in the wall

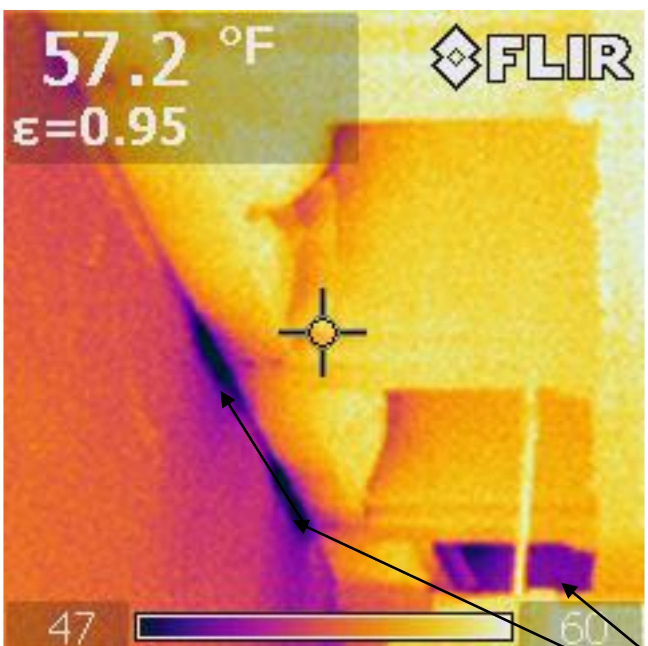


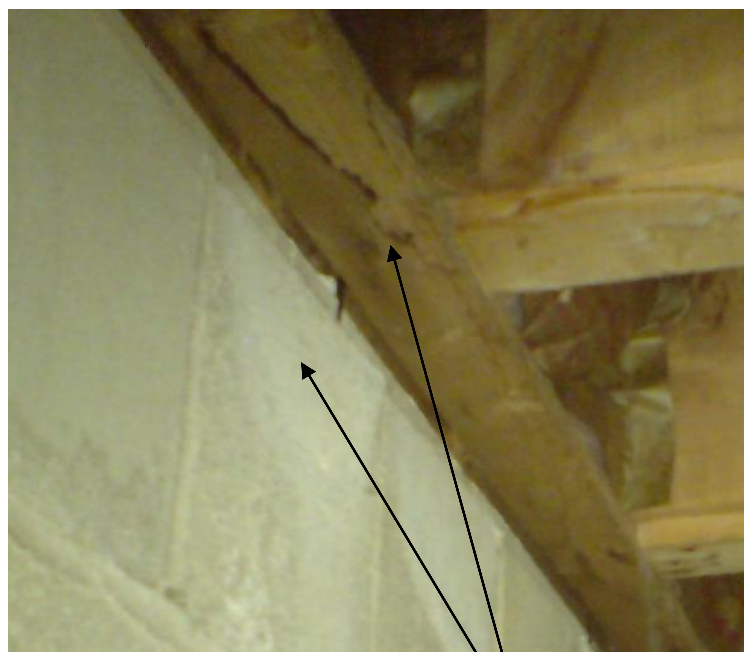


View of heat escaping into attic around gap at vent

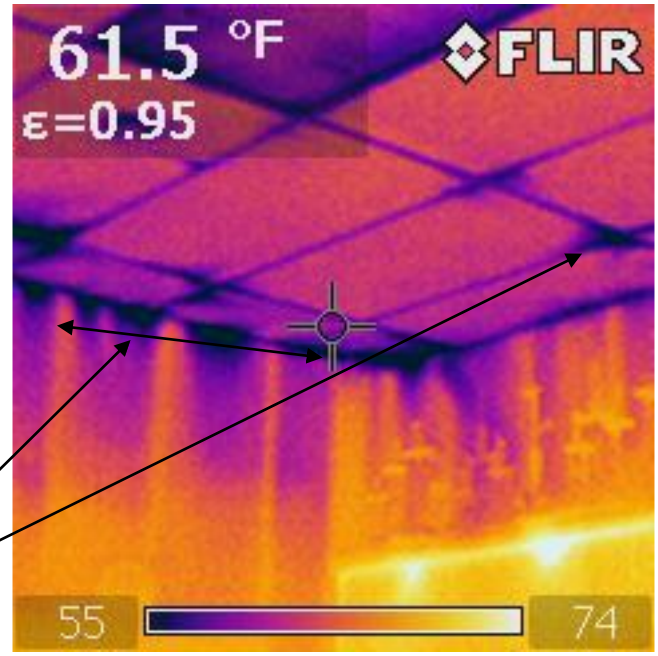


View of area where insulation has been pushed aside showing heat loss (yellow) through thin insulation & around pipe

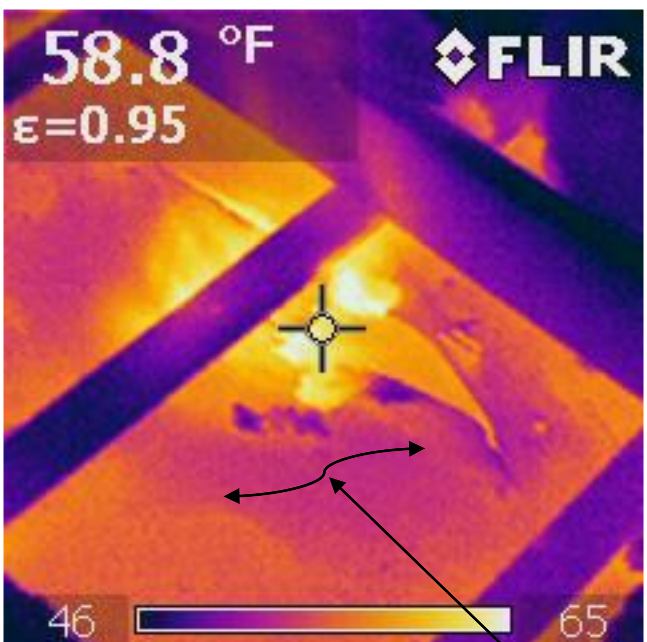




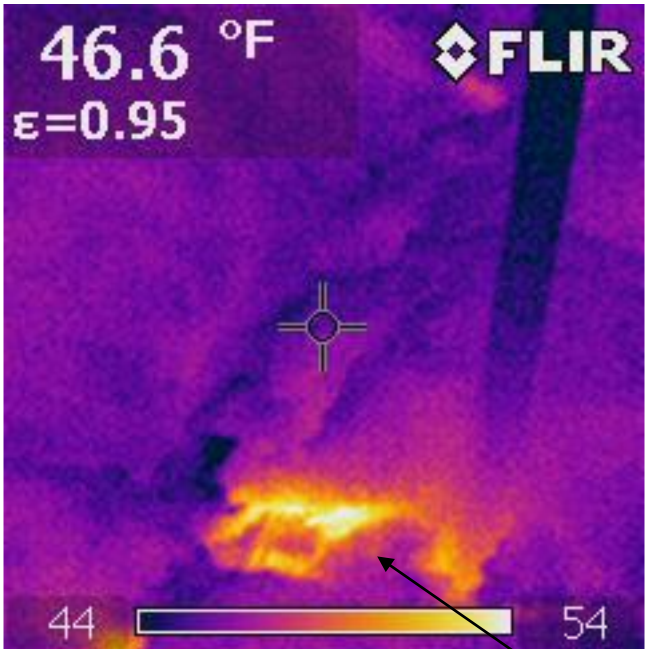
View of band joist showing cold (blue) air infiltration. Note signs of moisture on wall & strapping, likely caused by condensation



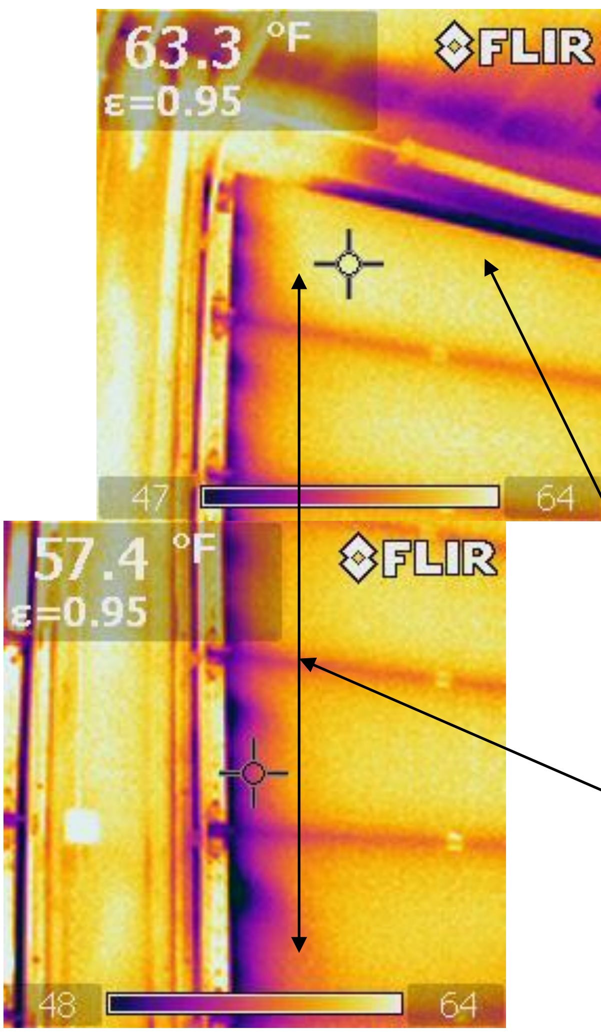
View of meeting room under negative pressure showing cold air infiltration form gaps, voids & penetrations

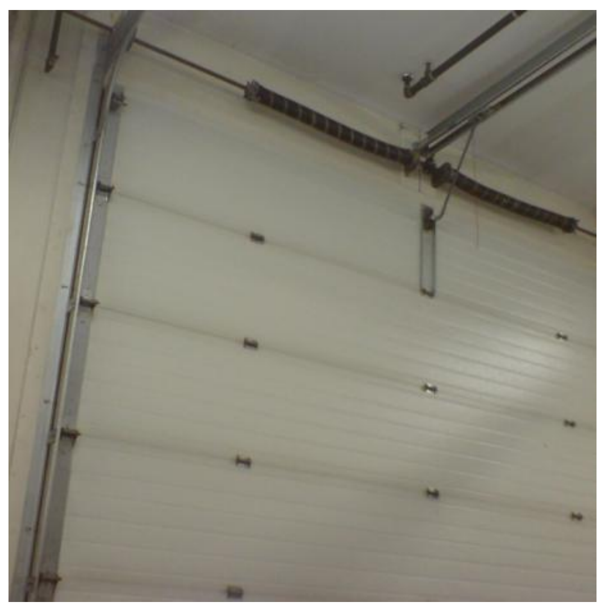


New apparatus bay showing section missing insulation & heat loss

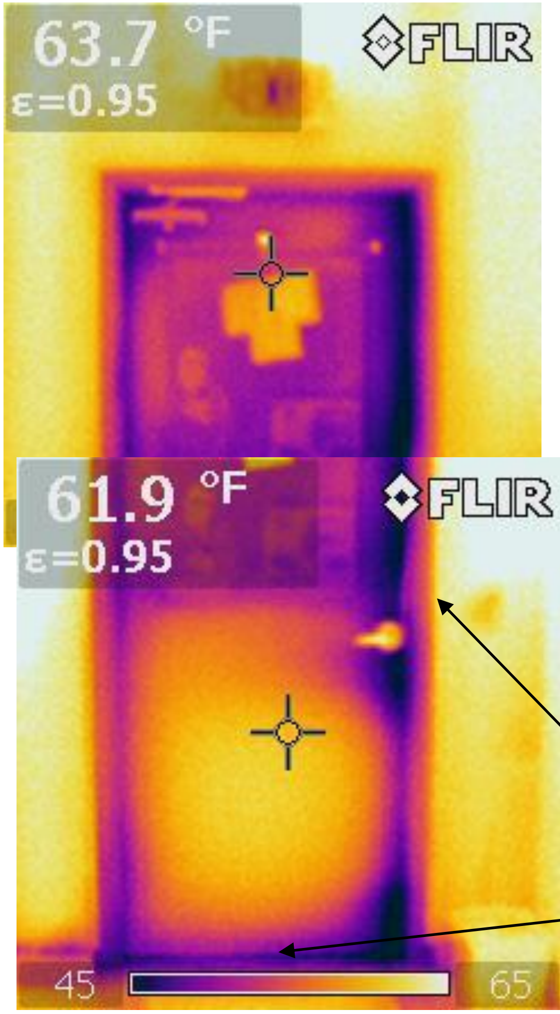


View of penetration showing heat loss in new apparatus bay





Middle overhead door showing air infiltration at edges



Door at east elevation at new apparatus bay showing air infiltration

6. Lighting

The predominant lighting fixtures are linear fluorescents, some newer T8's and a number of older T12's. There are some incandescent, CFL and high pressure sodium fixtures mixed in. The primary measure is to re-lamp and re-ballast the existing T12 fixtures with high performance T8's. In addition the recommended control strategy is to add sensors in rooms and areas to turn off lights when not occupied.

Where incandescent exist, it is recommended that they be replaced with CFL's and in some instances LED's, if they are on for extended periods of time. The recommendations are to replace exterior HPS lamps and man door fixtures with LED fixtures. The exterior spot lights are shown as being replaced with LED lamps, which will have an extended payback because of the low hourly usage. LED replacement lamps and fixtures are becoming more cost effective, the price is being reduced by half every two to three years, they are the least

expensive to operate, work well in cold weather, are dimmable, work with photo sensors and reduce replacement cost because of their long life.

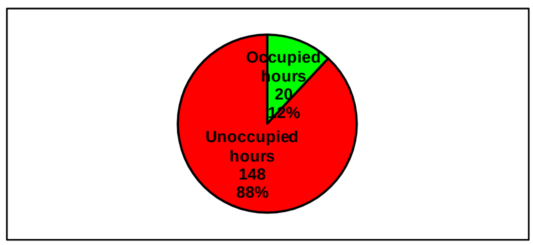
The tables below provide an approximate potential for energy savings opportunities to reduce electrical lighting consumption throughout the facility by upgrading a number of your lighting fixtures. These recommendations should result in better lighting control, more comfortable lighting and save lighting expense.

Summary Lighting Table

	Location	Fixture type	# of units	Watts per Unit	Max Total kW	Hrs/ Day	# of Days	Annual Operating Hours	Annual Total kWh	Annual kWh Cost	Potential Annual Savings	Annual kWh Saved
										$0.16		
Estimated Annual Lighting Usage and Cost									8,237	$1,318		
TOTAL Estimated Annual Lighting Savings											$714	4,461
Estimated Carbon Dioxide (CO2) Savings Tons Per Year												3.5

Based on 168 hours in a week

Occupied hours	Unoccupied hours
20	148



Eliot Fire Department Lighting Table												
1	Location	Fixture type	# of units	Watts per Unit	Max Total kW	Hrs/ Day	# of Days	Annual Operating Hours	Annual Total kWh	Annual kWh Cost	Potential Annual Savings	Annual kWh Saved
	Ground Level									$0.16		
Existing	Old App Bay	2L 1x4 T8	8	53	0.424	4	200	800	339	$54		
Retrofit	Add sensor	2L 1x4 T8	8	53	0.424	3	200	600	254	$41	$14	85
Existing		2L 1x4 T8	7	53	0.371	4	200	800	297	$47		
Retrofit		2L 1x4 T8	7	53	0.371	4	200	800	297	$47	$0	0
Existing	At interior door	1L CFL	1	14	0.014	24	365	8760	123	$20		
Retrofit		1L LED	1	9	0.009	24	365	8760	79	$13	$7	44
Existing	Lt Office	2L 1x4 T8	3	53	0.159	4.5	120	540	86	$14		
Retrofit		2L 1x4 T8	2	53	0.106	4.5	120	540	57	$9	$5	29
Existing	Radio Room	2L 1x4 T12	2	96	0.192	4	200	800	154	$25		
Retrofit		2L 1x4 HP T8	2	53	0.106	4	200	800	85	$14	$11	69
Existing	SCBA Room	2L 1x4 T8	2	53	0.106	4.5	120	540	57	$9		
Retrofit		2L 1x4 T8	2	53	0.106	4.5	120	540	57	$9	$0	0
Existing	Meeting Room	4L 2x4 T8	6	101	0.606	4	180	720	436	$70		
Retrofit		4L 2x4 T8	6	101	0.606	4	180	720	436	$70	$0	0
Existing	EMA Room	2L 1x4 T12	2	96	0.192	4	180	720	138	$22		
Retrofit		2L 1x4 HP T8	2	53	0.106	4	180	720	76	$12	$10	62
Existing	Kitchen	2L 1x4 T8	2	53	0.106	4	180	720	76	$12		
Retrofit		2L 1x4 T8	2	53	0.106	4	180	720	76	$12	$0	0
Existing	Hall	2L CFL	3	18	0.054	4	200	800	43	$7		
Retrofit		2L CFL	3	18	0.054	4	200	800	43	$7	$0	0
Existing	Women's Room	2L CFL	2	28	0.056	0.5	200	100	6	$1		
Retrofit		2L CFL	2	28	0.056	0.5	200	100	6	$1	$0	0
Existing	Men's Room	2L CFL	2	28	0.056	0.5	200	100	6	$1		
Retrofit		2L CFL	2	28	0.056	0.5	200	100	6	$1	$0	0
Existing	Storage Rm	2L 1x4 T8	2	53	0.106	0.5	120	60	6	$1		
Retrofit		2L 1x4 T8	2	53	0.106	0.5	120	60	6	$1	$0	0
Red indicates estimate									Annual Total kWh	Annual kWh Cost	Potential Annual Savings	Annual kWh Saved
										$0.16		
Estimated Annual Lighting Usage and Cost									1,767	$283		
Table 1 Estimated Annual Lighting Savings											$46	288

2	Location	Fixture type	# of units	Watts per Unit	Max Total kW	Hrs/ Day	# of Days	Annual Operating Hours	Annual Total kWh	Annual kWh Cost	Potential Annual Savings	Annual kWh Saved
										$0.16		
Existing	Deputy Chief	2L 1x4 T12	4	96	0.384	4	220	880	338	$54		
Retrofit		2L 1x4 HP T8	4	53	0.212	4	220	880	187	$30	$24	151
Existing	Conference Rm	2L 1x4 T12	6	96	0.576	3	180	540	311	$50		
Retrofit		2L 1x4 HP T8	6	53	0.318	3	180	540	172	$27	$22	139
Existing	Asst Chief	2L 1x4 T12	4	96	0.384	4	220	880	338	$54		
Retrofit		2L 1x4 HP T8	4	53	0.212	4	220	880	187	$30	$24	151
Existing	Chief	2L 1x4 T12	4	96	0.384	4	220	880	338	$54		
Retrofit		2L 1x4 HP T8	4	53	0.212	4	220	880	187	$30	$24	151
Existing	New App Bay	2L 1x4 T12	12	96	1.152	4	200	800	922	$147		
Retrofit	Add Sensor	2L 1x4 HP T8	12	53	0.636	3	200	600	382	$61	$86	540
Existing		2L 1x4 T12	12	96	1.152	4	200	800	922	$147		
Retrofit		2L 1x4 HP T8	12	53	0.636	4	200	800	509	$81	$66	413
Existing	At interior door	1L CFL	1	14	0.014	24	365	8760	123	$20		
Retrofit		1L LED	1	9	0.009	24	365	8760	79	$13	$7	44
	Basement Level											
Existing	Garage/Stg	1L CFL	5	14	0.07	1	52	52	4	$1		
Retrofit		1L CFL	5	14	0.07	1	52	52	4	$1	$0	0
Existing	Boiler Rm	1L CFL	3	14	0.042	1	52	52	2	$0		
Retrofit		1L CFL	3	14	0.042	1	52	52	2	$0	$0	0
	Exterior											
Existing	Spot Lights	2L INC	5	130	0.65	3	200	600	390	$62		
Retrofit		2L LED	5	30	0.15	3	200	600	90	$14	$48	300
Existing	O/H door light	1L Inc	7	75	0.525	2	120	240	126	$20		
Retrofit		1L CFL	7	15	0.105	2	120	240	25	$4	$16	101
Existing	Man door lights	1L Inc	4	75	0.3	13	365	4745	1,424	$228		
Retrofit		1L LED	4	12	0.048	13	365	4745	228	$36	$191	1,196
Existing	Up Lights & Flag	1L HPS	4	65	0.26	13	365	4745	1,234	$197		
Retrofit		1L LED	4	13	0.052	13	365	4745	247	$39	$158	987
Red indicates estimate									Annual Total kWh	Annual kWh Cost	Potential Annual Savings	Annual kWh Saved
										$0.16		
Estimated Annual Lighting Usage and Cost									6,470	1,035		
Table 2 Estimated Annual Lighting Savings											$668	4,174

This table is for informational purposes only. Always consult your lighting professional before specifying a new technology for your facility.

The estimated annual savings are based on a general walk through of the building and the reported operating hours.

Detailed energy savings should be determined by your electrician, supplier or manufacturer before a purchase is completed.

Your electrician, supplier or manufacturer must confirm that the proposed lighting meets the Efficiency Maine requirements to receive prescriptive cash incentives.

You can find Efficiency Maine incentives at www.efficiencymaine.com/pdfs/Prescriptive-Cash-Incentives.pdf.

7. Mechanical Systems

The mechanical systems are comprised of the heating, controls and domestic hot water systems.

7.1 Heating System & Controls

The heating system is a combination of forced hot air, in the original section of the building and fin tube baseboard in the newer section. The heat source is a Burnham 664,000 BTU-gross and 577,000 Btu-IBR oil fired boiler installed in 1995, firing at rate of 3.00 gph, and a SSE of 83.5% (efficiency). The seasonal efficiency is estimated to be in the 60% range based on industry studies. The boiler calculates to be about 40 Btu/SF for the building, which is reasonable considering its size and building envelope.

The boiler is 16 years old and approaching the end of its useful life, which is in the 20 to 25 year range. Since, natural gas is not available and propane is not cost effective as compared to oil, oil would still be the recommended fuel. When it comes time to replace the boiler a triple pass oil boiler is recommended and installing two smaller boilers that can be staged is preferred. These measures are estimated to save 5% and 10% to 15% respectively. In the mean time installing an outdoor reset can save an estimated 5% in fuel.

The older section of the building is heated by forced hot air via two air handlers. AHU #1 provides heat to the meeting room area and the garage basement and is controlled by a thermostat located in the meeting room. Whenever the meeting room calls for heat the basement also is supplied with warm air. This is not an efficient way to provide heat to the basement. The duct work is not sealed or insulated resulting in heat loss into the basement area. Heat loss of this nature is estimated to be between10% to 30% through the duct work. It was observed that the men's room was much warmer than the meeting room, and the women's room almost as warm as the men's room. The controls for the vanes on the floor dampers provided minimal ability to regulate air flow to improve the distribution of the warm air. This resulted in the two rest rooms being over heated and the meeting room calling for heat to satisfy the thermostat. AHU #2 serves the apparatus bay, it has an overhead duct that services the bay with minimal diffuser control and has a manual thermostat in the space controlling the heat.

If cost is not an issue it would be recommended to replace the system with fan driven unit heaters in the basement and apparatus bay,and fin-tube radiation in the meeting room area. A zone would be added for the basement with its own thermostat and the thermostat in the meeting area replaced with a programmable thermostat. However, because of the limited operating hours, estimated at 20/ week, and the low temperature settings, the payback

would be lengthy. A more economical approach would be to add another zone in the basement and heat with a fan powered unit heater. Sealing and insulating the duct work in the basement and adding a programmable thermostat in the meeting room is recommended. Also, replacing the floor registers with devices that can better control the air flow and distribute the air more evenly is recommended.

The 1995 section of the building has two zones; one is the apparatus bay with fan powered unit heaters and the other is in the office/conference room area with fin tube radiation. Both are controlled by manual thermostats. The system appears to be turned back manually when the building is not in use, but programmable thermostats would be helpful and could further savings by 5% to 10%.

Domestic hot water is provided from an indirect hot water tank from the boiler and is discussed in the next section.

View of boiler & fan powered unit heater

Below is a table showing the dollar reduction in fuel costs based up on a percentage improvement in fuel use. Using some industry parameters, if the recommeded improvements to the building envelope and the heating sytem were made a savings of 10% to 30% could be realized.

Estimated Fuel Oil Savings for Your Building Based on Cost Per Gallon						
Gallons of fuel oil used in 2008/2009	3,069					
Fuel oil cost per gallon	$3.15	$3.50	$4.00	$4.50	$4.50	$5.00
10 percent savings	$967	$1,084	$1,228	$1,381	$1,381	$1,535
15 percent savings	$1,450	$1,625	$1,858	$2,090	$2,090	$2,322
20 percent savings	$1,933	$2,148	$2,455	$2,762	$2,762	$3,069
25 percent savings	$2,417	$2,685	$3,069	$3,453	$3,453	$3,836
30 percent savings	$2,417	$2,685	$3,069	$3,453	$3,453	$3,836

Note: gallons of oil have been reduced to reflect the amount attributed to producing domestic hot water during the non-heating season.

7.2 Domestic Hot Water

Hot water is provided by an indirect hot water tank from the boiler. However, this causes the boiler to run 7 days per week during the non-heating season and raises the water temperature to 180^0 for heating rather than the 120^0 for hot water. It is estimated that 165 gallons of oil is used for hot water during the non-heating season for a cost of $ 520.

Because the building has periodic high demands a small electric hot water tank with a seven day timer is not practical.

Insulating the hot water supply and cold water feed piping in the boiler room is recommended.

View of 40 gallon Boiler mate indirect hot water tank

Below is a table showing the estimated hot water use for the building.

Estimated Hot Water Peak Demand and Yearly Use						
Fixture	**Units**	**Gals per minute**	**mins / day**	**gals / day**	**days / year**	**Gal Year**
Kitchen Sink	1	2	30	60	25	1500
Room showers	2	2	20	80	20	1600
Restroom Sink	2	0.5	10	10	200	2000
Dishwasher	1	2	10	20	20	400
Washing machine estimate 34 gallons per load. Loads will be hot water	1	2	17	34	25	850
Peak use in gallons per minute (all fixtures on simultaneously)						11
Estimated total gallons of hot water per year						**5,500**
Days per year hot water is used						**200**
Estimated gallons of hot water used per day						**28**
These are estimates based on the number of fixtures and estimated use.						
Actual domestic hot water usage should be calculated by the supplier who is proposing the equipment.						

Based on the usage and projected cost savings it is recommended that the indirect hot water tank on the boiler be replaced with a propane fired 7 gpm tankless hot water heater.

The table below shows the estimated savings that can be realized.

Estimated cost to Install Tankless Propane Heater			
Equipment/Labor	**Qty**	**cost each**	**Total**
Tankless water heater with controller	1	$1,800	$1,800
Installation Labor	6	$70	$420
Contingency	2	$70	$140
Estimated installed capital cost			**$2,360**
Eff Maine Incentives	1	$0	**$0**
Cost to Implement (capital cost-incentives)			**$2,360**
*Projected Yearly Energy Savings			**$252**
Simple Payback in Years			**9.4**
Tankless water heater is commercial grade rated at 200,000 Btu's and a a max temperature of 180°F.			

Based on the projected savings the payback for changing the domestic hot water system is about 9 years.

7.3 Ventilation

Ventilation consists of three sources: a PlymoVnet Source Capture system in the apparatus bay, a two speed exhaust hood in the kitchen and exhaust fans in the rest rooms.

The PlymoVent is relatively new and appears to function per design and complies with code. The kitchen exhaust vent appeared to have sufficient exhaust and did not show signs of leakage other then the vent opening previously discussed. Bath room fans appear to provide adequate ventilation for the space. When the time comes for replacement more efficient fans such as Whisper Jet by Panasonic are recommended.

Because of the buildings low hours and intermittent usage, a building wide ventilation system should not be required unless the usage changes to a full time department.